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Basic Imagery Interpretation Report

NATIONAL
PHOTOGRAPHIC
INTERPRETATION
CENTER

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SOLIKAMSK POWDER AND SOLID MOTOR PLANT BOROVSK

25X1A [redacted]

STRATEGIC WEAPONS INDUSTRIAL FACILITIES

USSR

JANUARY 1969

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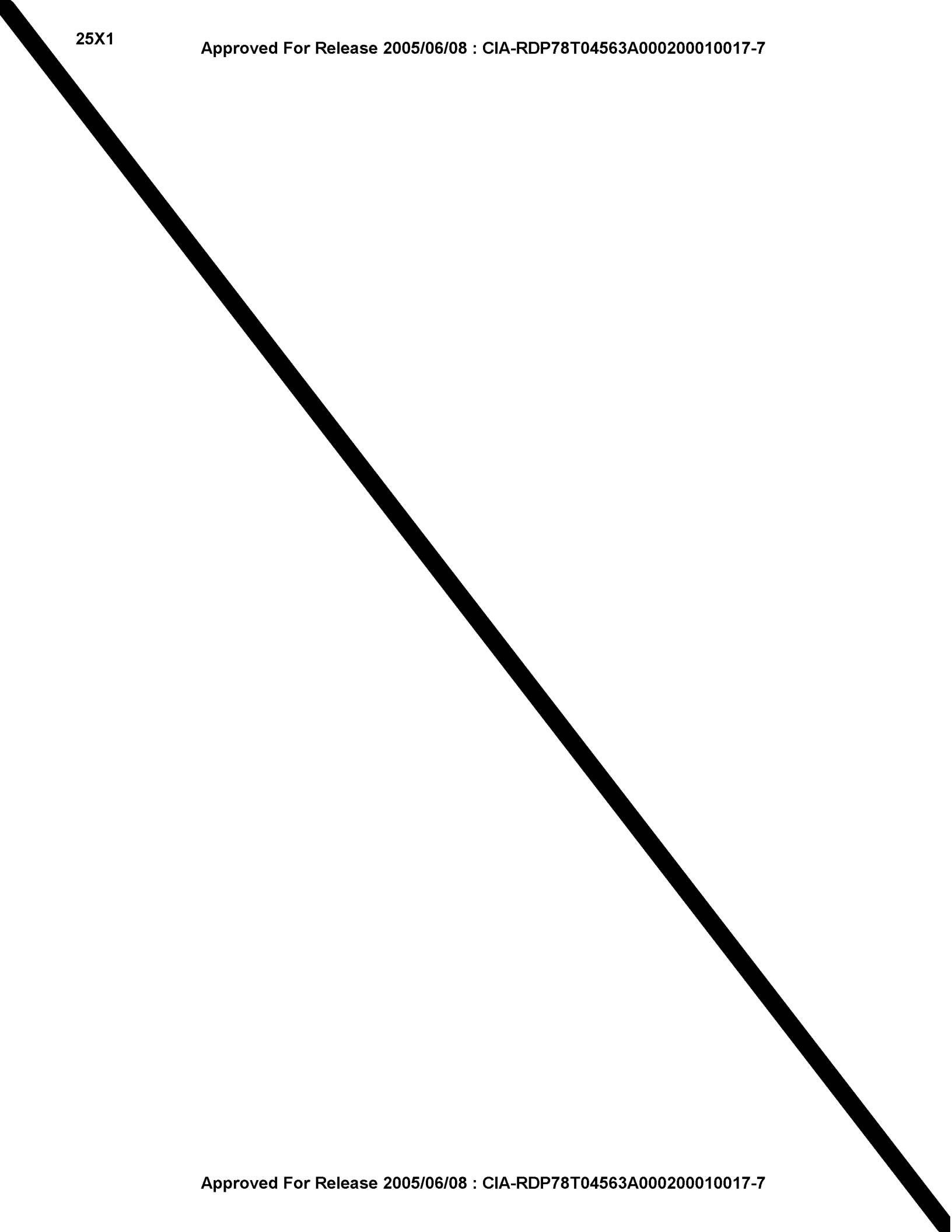

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Jan. 1969 TS

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INSTALLATION OR ACTIVITY NAME: Solikamsk Powder and Solid Motor Plant Borovsk

COUNTRY: UR

25X1A

UTM COORDINATES: 40VDM844148

GEOGRAPHIC COORDINATES: 59-40-18N 056-42-50E

MAP REFERENCE: USATC, Series 200, Sheet 156-1

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ABSTRACT

The Solikamsk Powder and Solid Motor Plant Borovsk manufactures double base propellant and small rocket motors made of extruded grains of double base propellant. The rocket motors can be tested in the small horizontal test cell (Type F) at the original test facility.

A horizontal test cell (Type B) similar to test cells at other double base propellant solid rocket motor production plants has been externally completed, but no blast deflector is present and the cell is not operational. The plant does not appear to be capable of producing motors of sufficient size to require a Type B test cell. Therefore, facilities at the plant will probably be modified in order to produce larger motors in the future.

SUMMARY/CONCLUSIONS

This report is one of a series of studies of Soviet solid propellant production plants, the purpose of which is to allow an overall assessment of the Soviet rocket motor production program.

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The plant was road and rail served and appeared to be operational when it was first observed [redacted] Expansion to its present size was essentially complete [redacted]

A horizontal test cell (Type B) similar to the small horizontal test cells associated with other Soviet rocket motor production plants appeared to be externally complete on photography [redacted] however, no blast deflector has been built. The larger size of this new test cell suggests that it is not connected with the present production of the facility. A test cell in the Original Test Facility appears to be large enough to test small extruded-grain rockets or bundled grains of extruded propellant such as that used in the SA-2 Guideline booster.

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It is predictable that a casting facility (like those in the other rocket motor production plants with similar Type B test cells) may be added in the future.

INTRODUCTION

This report contains the chronology of construction of the Solikamsk Powder and Solid Motor Plant Borovsk which is located between Solikamsk and Borovsk, USSR. The plant consists of four separately secured parts: the Double Base Solid Propellant Rocket Motor and Propellants Production Plant (Figures 1 and 2) referred to in this report as the Double Base Plant; an Original Test Facility (Figures 1 and 2) north of the Double Base Plant; a New Test Facility (Figures 1 and 2) on the south side of the Double Base Plant; and a small Explosives Storage Area 1.5 nautical miles (nm) northeast of the Double Base Plant.

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[redacted]

Steamlines, roads, and rail spurs are not included in the chronology because of the poor interpretability of early photography.

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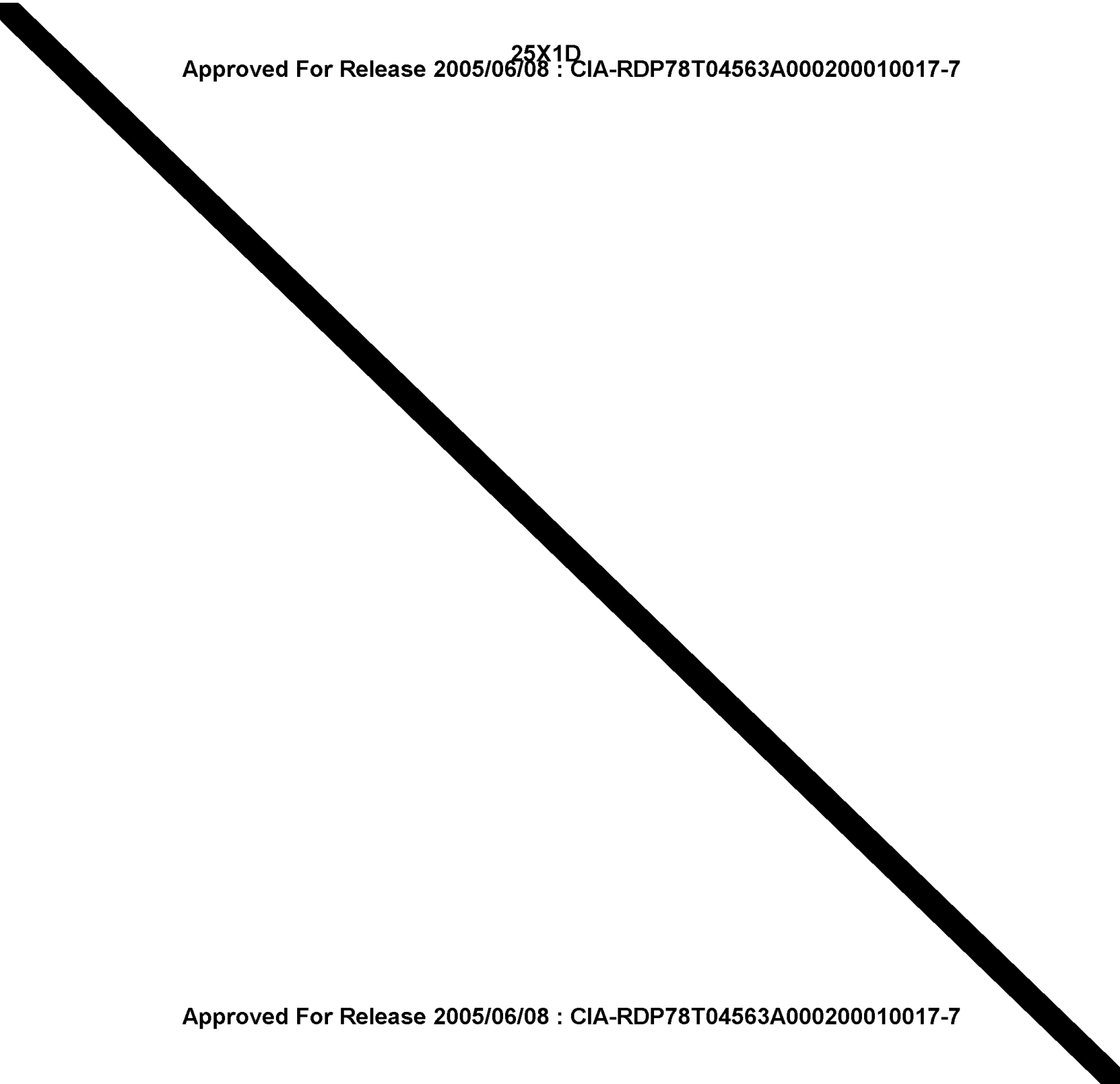


Table 1. Solikamsk Powder and Solid Motor Plant Borovsk (Item numbers keyed to Figure 2)

Item	Function/Description	Comments
1	Poss motor pool	[redacted] bldg is between items 1 and 2
2	Unidentified bldg	This bldg is outside the secured area
3	Gatehouse	
4	Prob inert components mfg bldg	Rail served
5	Prob inert components mfg bldg	Rail served; has a [redacted] prob engineering portion attached which was complete [redacted]
6	Covered rail to road transfer point	Rail served
7	Poss final product shipping bldg	Rail served; may not have been present until later
8	Poss final product shipping bldg	Rail served; may not have been present until later; items 7 & 8 are separately secured from rest of plant
9	Prob sensitive components storage bldg	A small support bldg is on SE side
10	Prob finishing bldg	
11	Prob finishing bldg	
12	Gatehouse	
13	Unidentified bldg	
14	Prob inert components mfg bldg	Rail served
15	Prob sensitive component storage bldg	May be barricaded
16	Poss barracks	
17	Poss lab/engineering bldg	A bldg on NW side [redacted] was later removed
18	Shop bldg	May not have been present until later; a [redacted] structure is NW of item 18
19	Poss lab/engineering bldg	
20	Prob propellant finishing bldg	A small bldg occupying NE end of this site [redacted] was later razed
21	Prob propellant finishing bldg	
22	Storage bldg	Barricaded
23	Prob propellant finishing bldg	
24	Prob sensitive components preparation bldg	
25	Storage bldg	Barricaded
26	Prob sensitive components preparation bldg	
27	Double base processing bldg	
28	Prob propellant finishing bldg	
29	Prob propellant finishing bldg	
30	Prob propellant finishing bldg	Three 20- x 10-foot horizontal tanks are to the west. A prob guard tower is to the NE
31	Prob handling bldg	Rail served; served on NW end by overhead crane
32	Poss acid plant	
33	Control & switching house for substation	
34	Fabrication/assembly bldg	
35	Shop bldg	A 20- x 20-foot bldg is on NW side
36	Prob propellant finishing bldg	
37	Prob double base drying bldg	
38	Prob double base drying bldg	
39	Unidentified bldg	A guard tower is SE
40	Prob receiving bldg	Rail served; [redacted] bldg is on SE side; four 25- x 10-foot horizontal tanks are on north side
41	Prob double base drying bldg	
42	Prob double base drying bldg	
43	Prob double base drying bldg	
44	Prob double base drying bldg	
45	Sensitive storage bldg	A similar barricaded bldg to the SW [redacted] was later removed
46	Prob double base drying bldg	
47	Prob double base drying bldg	

Table 1. (Continued)

Item	Function/Description	Comments
48	Prob double base drying bldg	
49	Prob double base drying bldg	
50	Prob double base drying bldg	
51	Prob double base drying bldg	
52	Prob double base drying bldg	
53	Double base processing bldg	
54	Double base processing bldg	
55	Double base processing bldg	
56	Prob double base processing bldg	Later modified or partially razed. Appeared half complete [redacted] 25X1D
57	Double base processing bldg	
58	Double base processing bldg	
59	Double base processing bldg	
60	Double base processing bldg	
61	Double base processing bldg	
62	Unidentified bldg	Barricaded
63	Double base processing bldg	
64	Double base processing bldg	A barricaded possible personnel shelter is on the north side
65	Sensitive storage bldg	Barricaded
66	Double base processing bldg	A small support bldg is SE
67	Double base processing bldg	
68	Prob receiving bldg	Rail served; may have been enlarged later
69	Prob pumphouse	A small support bldg is SE
70	Semiburied tank	A tank [redacted] is between items 70 & 71. A guard post is SE 25X1D
71	Semiburied tank	
72	Prob tanks	Earth mounded
73	Ingredient preparation bldg	
74	Ingredient preparation bldg	
75	Ingredient preparation bldg	Rail served
76	Ingredient preparation bldg	Rail served
77	Admin bldg or gatehouse	An admin area consisting of 6 bldgs and 5 small structures is outside fence to NE
78	Prob barracks/admin bldg	Three structures [redacted] are on south side 25X1D 25X1D
79	Poss engineering bldg	Rail served
80	Unidentified structures	
81	Unidentified structures	
82	Unidentified structures	
83	Poss acid recovery bldg	A prob acid storage area containing 4 bldgs [redacted] to SE 25X1D 25X1D
84	Poss acid recovery bldg	A small tank is to the SE
85	Prob nitrator bldg	Probably Schmid-Meissener-Type
86	Nitrator/separator bldg	Probably Biazzi-type
87	Prob nitroglycerin wash house	
88	Rest house	
89	Rest house	
90	Prob nitroglycerin wash house	Had connecting walkways and/or covered pipolines removed [redacted] 25X1D 25X1D
91	Nitrator/separator bldg	Barricading appeared complete on [redacted] Probably Biazzi-type 25X1D
92	Poss tank	A [redacted] structure is NE 25X1D
93	Rest house	Barricading appeared complete on [redacted] 25X1D
94	Nitroglycerin magazine	
95	Nitroglycerin magazine	
96	Nitroglycerin magazine	
97	Double base propellant mixing bldg	A small support bldg is on south side
98	Double base propellant mixing bldg	

Table 1. (Continued)

Item	Function/Description	Comments
99	Double base propellant mixing bldg	
100	Poss lab test bldg	
101	Poss lab test bldg	
102	Prob double base mixing bldg	
103	Prob double base mixing bldg	
104	Prob solvent storage bldg	A [redacted] bldg & a tank [redacted] on NE side [redacted] a semiburied tank is on NE side & another on SW side
105	Double base processing bldg	
106	Double base processing bldg	
107	Double base processing bldg	
108	Double base processing bldg	
109	Double base processing bldg	
110	Double base processing bldg	
111	Double base processing bldg	Complete [redacted]
112	Prob barracks	A [redacted] support bldg is NE
113	Poss bldg site	Incomplete [redacted]
114	Rolling & extrusion bldg	A large bldg on SW side [redacted]
115	Final nitrocellulose processing bldg	[redacted] was later razed
116	Boiling tub house	An addition was complete [redacted]
117	Prob lab test bldg	A small structure is on SW side
118	Spent-acid storage & recovery bldg	Three small tanks are associated with this bldg
119	Horizontal tanks	Two tanks are evident
120	Cellulose nitration bldg	
121	Nitric acid plant	
122	Acid mix bldg	
123	Cellulose storage bldg	Rail served
124	Cellulose preparation bldg	Rail served
125	Prob receiving/shipping bldg	Rail served; has a semiburied tank on east side
126	Final nitrocellulose processing bldg	
127	Unidentified bldg	
128	Double base processing bldg	
129	Prob propellant finishing bldg	
130	Double base processing bldg	
131	Double base processing bldg	
132	Double base processing bldg	
	6 Warehouses	
	53 Support bldgs	

[redacted]

25X1D

DESCRIPTION

Double Base Plant

The Double Base Plant appears to be typical of Soviet-designed plants. The nitroglycerin production area of the Double Base Plant contains three nitration lines. The nitrator building in one of the lines appears to contain the older Schmid/Meissener-type nitrator (item 85, Table 1 and Figure 2) identical to that used in one of the nitrator buildings at Sterlitamak. The other two nitrators (items 86 and 91) appear to use the newer Biazzi process and seem to be identical to those identified at Kamensk-Shakhtinskiy, Perm, Biysk, Krasnoyarsk, and Sterlitamak. 1-5/

Table 2. Solikamsk New Test Facility (Item numbers keyed to Figure 2)

Item	Function/Description		Comments
1	Horizontal test cell		
2	Above-ground tank		An excavation was observed to the north [redacted] but no structure was built
3	Prob impact bunker		Probably used in conjunction with a shell test range
	8 Support bldgs		

25X1D

Table 3. Solikamsk Original Test Facility (Item numbers keyed to Figure 2)

Item	Function/Description		Comments
1	Above ground tank		
2	Above ground tank		
3	Semiburied tank		
4	Prob small motor/component test cell		Has [redacted] blast containment walls between the test cell and the blast deflector
5	Prob engineering bldg		Four stories
6	Bldg under construction		Under construction [redacted] outside secured area
7	Prob barricade		Probably used in connection with a shell test range
	7 Support bldgs		

25X1D

The nitrocellulose production facilities in the Double Base Plant appear to be typical of Soviet nitrocellulose production areas. A nitric acid plant (item 121) between the nitroglycerin and nitrocellulose areas probably supplies acid to both. No evidence of sulfuric acid production can be found. Sulfuric acid, glycerol, neutralizing agents, and solvents are probably brought into the plant by rail.

A separately secured probable shipping area (items 7 and 8) is in the southern part of the plant. A walled administration and maintenance area occupies the southeast corner of the plant.

The Double Base Plant appears to have two distinct production lines. One double base propellant production line appears to lead from the probable double base mixing buildings (items 102 and 103) through the large rolling and extrusion building (item 114), through the double base processing buildings (items 130 and 132) to the probable propellant finishing building (item 129).

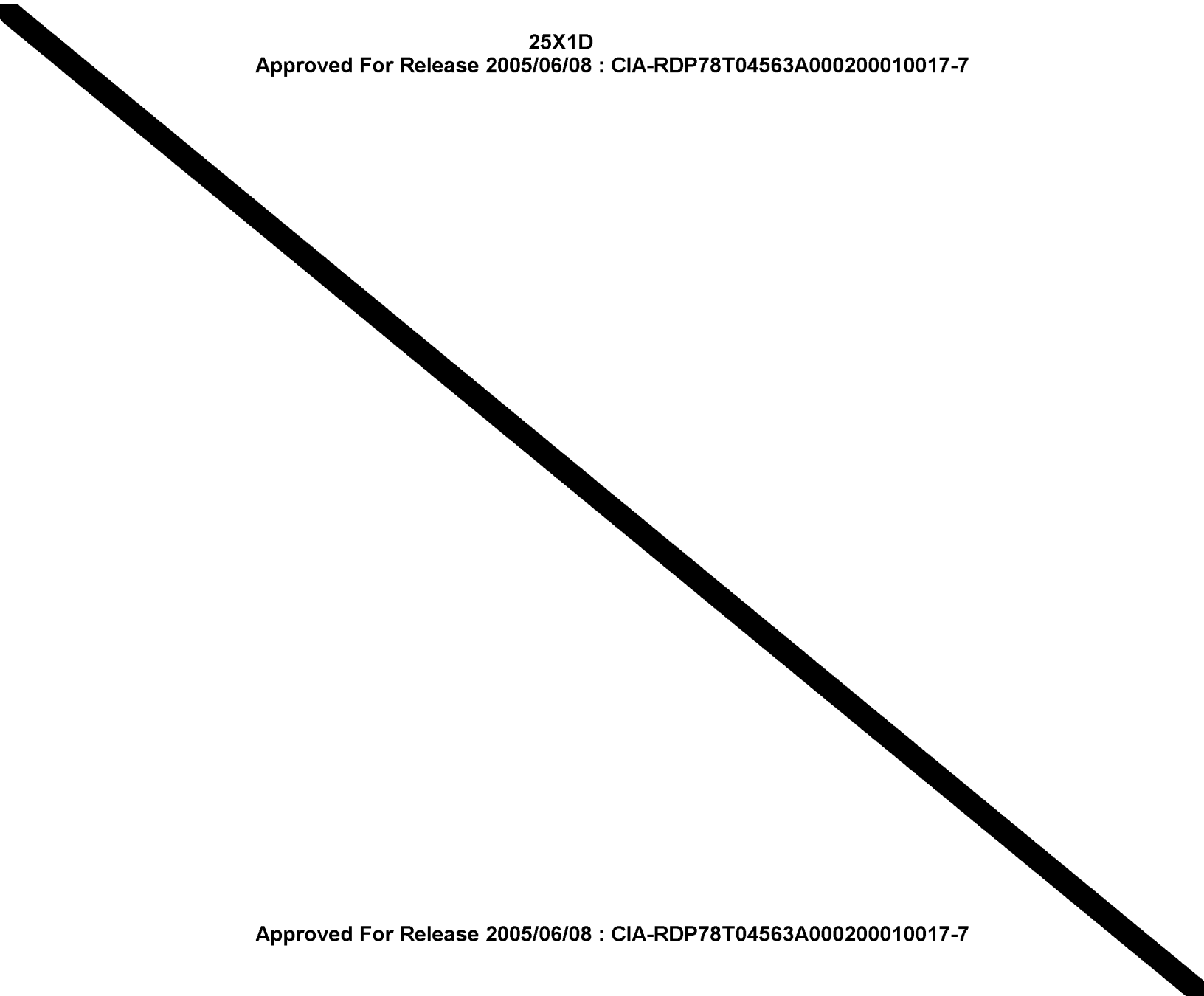
Double base propellant also appears to move from the probable double base mixing buildings (items 102 and 103) through the double base processing buildings (items 27, 53, 54, 55, 57, 58, 59, 60, 61, 63, 64, 66, 67, 105, and 106). The fact that the plant was probably operational when it was first observed [redacted] strongly suggests that these buildings were then producing double base propellants for conventional weapons; however, the same type of building may be used to produce casting powder.*

25X1D

Original Test Facility

The Original Test Facility contains, in addition to a probable shell test range, a small horizontal test cell (Type F) similar to one in the Original Test Facility connected with

*Casting powder is a double base propellant in granular form. It is poured into a mold or motor case and a solvent, usually mostly nitroglycerin, is added to the casting powder to form a homogeneous solid propellant.



the Double Base Plant at Munitions & Chemical Combine K. Kirov 98 at Perm, USSR. 2/

The test cell has an attached building and blast containment walls which connect it with the blast deflector. The test cell is probably used for the testing of small extruded-grain rockets and appears to be capable of testing motors of SA-2 Guideline booster class.

Several support structures, the probable shell test range, and some tankage are also within the secured heavily wooded area. Three support structures and one multistory probable engineering building are outside the secured area of the Original Test Facility. Some or all of the structures in the secured area of the test facility may have been present 25X1D

New Test Facility

The test cell in the New Test Facility appears to be larger than would be necessary for the testing of bundled grain-type rocket motors or other small extruded-grain rockets which may be produced at the Double Base Plant. The test cell (item 1, Table 2 and Figure 2) is nearly identical to test cells at Sterlitamak, Krasnoyarsk, and Biysk. The blast deflector normally associated with this type of test cell is not yet evident. It is anticipated that the fence on the northwest side of the test facility will be moved in order to make room for the construction of the blast deflector. That construction practice was used in the building of the blast deflector for the test cell at Sterlitamak. 5/

Explosives Storage Area

25X1D This is a small area containing 13 storage buildings, which were complete 25X1D and four other small support buildings. Two of these support buildings were first 25X1D observed The roof cover of the buildings in the area 25X1D

Related Facilities

25X1A Cellulose is obtained from Solikamsk Cellulose Plant Borovsk 2 nm northwest of the Double Base Plant. 6/

25X1D

KH-4 photography of poor interpretability confirmed the existence of the facility, but no details were obtainable.

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KH-4 photography of poor interpretability showed that most of the buildings in the plant were complete. Two of the nitroglycerin lines and the nitrocellulose processing area were complete. The double base mixing buildings were probably present but were indiscernible. All the other elements necessary for production were present. The outline of the Original Test Facility was identifiable, although individual buildings were not discernible. The Explosives Storage Area appeared to be essentially complete. A large probable double base processing building outside the wall on the southwest side of the 25X1D plant appeared to be complete. It was later partially razed. The total roof cover (given for the Double Base Plant only) was 1,012,830 square feet.

25X1D

KH-4 coverage of improved interpretability confirmed the presence of the previously identified buildings. The fence lines on the northwestern end of the plant had been extended. Three double base processing buildings (items 130-132, Table 1 and Figure 2) and a probable propellant finishing building (item 129) had been completed. Three double base mixing buildings (items 97-99) were observed to be complete. A barricaded storage building (item 25) and two probable propellant finishing buildings (items 21 and 29) had also been completed. A control and switching house and a substation (item 33) became evident, along with numerous other support buildings. A buried tank and four support structures were observed in the Original Test Facility. Additional roof cover (given for the Double Base Plant and the Original Test Facility) was 336,300 square feet.

25X1D [redacted]

No significant change was observed on photography of poor interpretability.

25X1D [redacted]

Three new support buildings were completed in the New Test Facility. Several support structures were also completed with the Double Base Plant. A multistory probable engineering building (item 5, Table 3), a small motor/component test cell (item 4), and a support building were evident in the Original Test Facility. The small test cell was probably present considerably before this time but was not discernible. Additional roof cover in all three areas [redacted]

25X1D

25X1D [redacted]

A horizontal test cell (item 1, Table 2) was under construction in the New Test Facility. Three support buildings, two above-ground tanks, and a probable impact bunker (item 3) for a probable shell test range were also evident. This stereo photography, the best to date [redacted] also showed the completion of the barricading of the buildings in the third nitroglycerin line (items 91 and 93, Table 1), the completion of a probable propellant finishing building (item 20), two support buildings, one unidentified building, and an addition to a probable inert components manufacturing building (item 5) in the Double Base Plant. Additional roof cover in the Double Base Plant and the New Test Facility [redacted]

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25X1D [redacted]

Essential Services

The plant is road and rail served. Heat is supplied by a steam plant adjacent to the northeast side of the plant. Electricity is supplied to the plant from a local source.

Security

The Double Base Plant is secured by a wall and fences. The Original Test Facility also has both a wall and a fence. The New Test Facility is walled. The nitroglycerin area is separately walled, and the maintenance and service area is separated from the double base production area by a wall.

REFERENCES

25X1D

MAPS OR CHARTS

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REQUIREMENT

COMIREX 335-69

NPIC Project 210441